EFFICACY OF FORMALIN IN THE REMOVAL OF ADHESIVENESS FROM *Clarias gariepinus* EGGS DURING ARTIFICIAL PROPAGATION

Adebayo, O.T. & Olayinka, S.O.
Department of Fisheries and Aquaculture Technology
Federal University of Technology, PMB 704, Akure

ABSTRACT

The aim of this study was to establish the efficacy of formalin in removing the adhesiveness of *Clarias gariepinus* eggs during artificial propagation and the effects on prospective fry. 1g of catfish eggs were put in five concentrations of formalin {0.0 (control), 0.4, 0.6, 0.8 and 1.0 mg/1} at three exposure times (10, 15 or 20min). In each treatment, the detachment of eggs increases with exposure time but were not significantly different (P>0.05). 0.4mg/l of formalin had the highest number of detached eggs. At the highest formalin concentration 72% of the eggs still adhered together which provide a good substrate for the growth of fungi. The use of formalin delayed hatching of *C. gariepinus* eggs when compared with the control. The more the exposure period of *C. gariepinus* eggs to formalin, the higher the hatching time. Survival of fry was highest in the group that has been exposed to 0.4mg/l and exposure period of 10min. At the highest concentration (1.0mg/l) and exposure period (20min), the survival was lower by 55.5%. Based on this study, the optimum concentration of formalin was 0.4mg/1 and exposure period of 10min. for the removal of egg adhesiveness, increase hatching and improved survival success of *C. gariepinus.*

INTRODUCTION

Aquaculture is the fastest growing sector of the world food economy, increasing by more than 10% per year and accounts for more than 30% of all fish consumed (FAO, 1992). Insufficient viable fish seeds for fish farmers to boost aquaculture production remain the major limitation to aquaculture development. This limitation has necessitated a sound management practices and technologies in producing viable fish seeds for fish farmers to enhance aquaculture production through hatchery production. The primary factor that determines the success of hatchery production programmes is obtaining gametes of the highest biological quality. The effectiveness of artificial propagation is determined by the number of larvae produced; this depends partly on the method with which the adhesiveness of the eggs is removed.

Clarias gariepinus is the only fresh water species with the widest latitudinal range in the world (Haylor, 1989). These are prominent in African aquaculture due to their fast growth rate, resistance to diseases, tolerance to high density culture, ability to grow on a wide range of natural and low cost artificial foods and ability to withstand low oxygen and pH levels (Zheng *et al.*, 1988, Fagbenro *et al.*, 1993). *C. gariepinus* eggs has adhesive chorion which allows the eggs to stick together thereby forming a solid throng which makes gas exchange difficult thereby enhancing the development of pathogens.

Formalin is a solution of 37-40% formaldehyde gas dissolved in water (Van waters and Rogers, 1988) and is the only fungicide registered for use in aquaculture in the United States (Bruno and Woods 1994; Marking et al; 1994). It is widely used in therapeutic and prophylactic treatment by aquaculturists (Floyd, 1996). It is one of the most effective anti fungal agents used to control fungal infections on eggs and improves hatching rate (Mitchell and Collins, 1997). The objective of this study was therefore to determine the efficacy and optimum concentration of formalin in removing the adhesiveness from *C, gariepinus* eggs during artificial propagation.

MATERIALS AND METHODS

Ripe male and female *C. gariepinus* were obtained from Teaching and Research Fish Farm, Federal University of Technology, Akure and were selected for induced spawning on the basis of external morphological features as described by (Viveen *et al.*, 1985). The female catfish was injected intramuscularly with ovaprim at 0.5ml/kg and was gently placed inside plastic bowl. The female fish was removed from the plastic bowl after 12 hours when ovulation had been completed. Stripping was carried out as described by Janssen (1989); gentle pressure was applied on the abdomen at the antero-posterior direction to strip out the eggs. The ovulated eggs were collected into a dry plastic bowl. The milt from the sacrificed male was then squeezed out of the testes evenly on the egg mass and mixed with the aid of a tablespoon.

After fertilization, 1g of catfish eggs were put in five concentrations of formalin {0.0 (control), 0.4, 0.6, 0.8 and 1.0 mg/1} at three exposure times (10, 15 or 20min). Each experimental variant was conducted in triplicates. The eggs were stirred during the rinsing procedure. The eggs were then

placed in transparent plastics after the exposure time had lapsed. Eggs adhesiveness removal was measured by observing the rate at which eggs were detached from one another in each solution and the control. The time of hatching (the onset of hatching) were recorded for each treatment. After hatching, the numbers of hatchlings within each treatment were cautiously counted and the hatchability was calculated as follows:

$$\text{Hatchability} = \frac{\text{Number of hatched eggs}}{\text{Total number of eggs}} \times 100$$

$$\text{Survival} = \frac{\text{Number of hatchlings alive up to yolk sac absorption}}{\text{Total number of eggs}} \times 100$$

All percentage data were arc-sine transformed before they were subjected to ANOVA. Where there were significant differences in means, they were further tested with least significant different at 0.05 level of significance.

RESULTS AND DISCUSSION

Removal of egg stickiness by formalin of varying concentration and exposure period is shown in Fig. 1. Detachment of eggs at 10min exposure to 0.0, 0.4, 0.6, 0.8 and 1.0mg/l of formalin were 5.5%, 87%, 61%, 45% and 25%, respectively. During 15min exposure to 0.0, 0.4, 0.6, 0.8 and 1.0mg/l of formalin, the detachment of eggs were 6%, 90%, 63%, 44% and 27%, respectively. While in 20minutes exposure to 0.0, 0.4, 0.6, 0.8 and 1.0mg/l of formalin the detachment of eggs were 6.2%, 91%, 66%, 46% and 28%, respectively. In each treatment, the detachment of eggs increases with exposure time but were not significantly different ($P>0.05$). 0.4mg/l of formalin had the highest number of detached eggs.

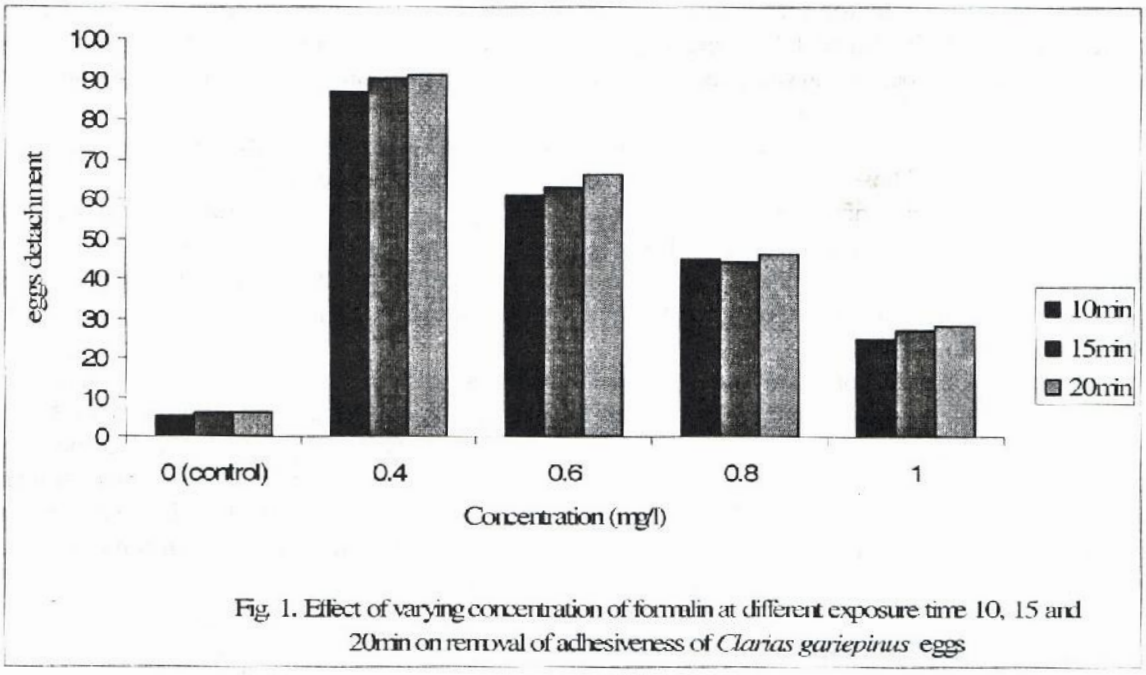

Fig. 1. Effect of varying concentration of formalin at different exposure time 10, 15 and 20min on removal of adhesiveness of *Clarias gariepinus* eggs

The use of formalin delayed hatching of *C. gariepinus* eggs as shown in Fig.2 when compared with the control. The first hatching after fertilization was 24.25hours in the control, while it was 24.5hrs in formalin treatment concentration of 0.4mg/1. In formalin concentration of 0.6, 0.8 and 1.0mg/1 at 10mins exposure period, the first hatching was noted at 25.25, 25.5 and 25.75 hours, respectively. The more the exposure period of *C.gariepinus* eggs to formalin, the higher the hatching time. The concentrations of formalin (1.0mg/l) and exposure period (20min.) were too high thus causing low hatching and high mortality (Fig. 3.). This is a clear pointer to the acute toxicity effect of high concentrations of formalin on the eggs thereby causing low hatchability. It was observed in the control at the time of hatching that a large percentage of the embryos that could not detached themselves from one another died after a few minutes. The hatching percentage of *C. gariepinus* eggs decreased with increasing concentration of formalin and exposure period.

The effect of pre formalin treatment on the survival of fry is shown in fig. 4. Survival of fry was highest in the group that has been exposed to 0.4mg/l and exposure period of 10min. At the highest concentration (1.0mg/l) and exposure period (20min), the survival was lower by 55.5%. At the highest formalin concentration 72% of the eggs still adhered together which provide a good condition for the growth of bacteria and fungi and hence reducing the survival of embryo and subsequently the larval and fry. According to (Haylor, 1993), high survival of eggs of embryos are achieved if the eggs float singly and not clumped together in the water.

It can be concluded based on this study that the optimum concentration of formalin was 0.4mg/1 and exposure period of 10min. for the removal of egg adhesiveness, increase hatching success and improved survival success of *C. gariepinus*. The optimum concentration level recorded in this study and exposure period should be combined with proper husbandry techniques and good hatchery management for effective control and prevention of saprolegnia in catfishes which occurred as a result of eggs adhesiveness.

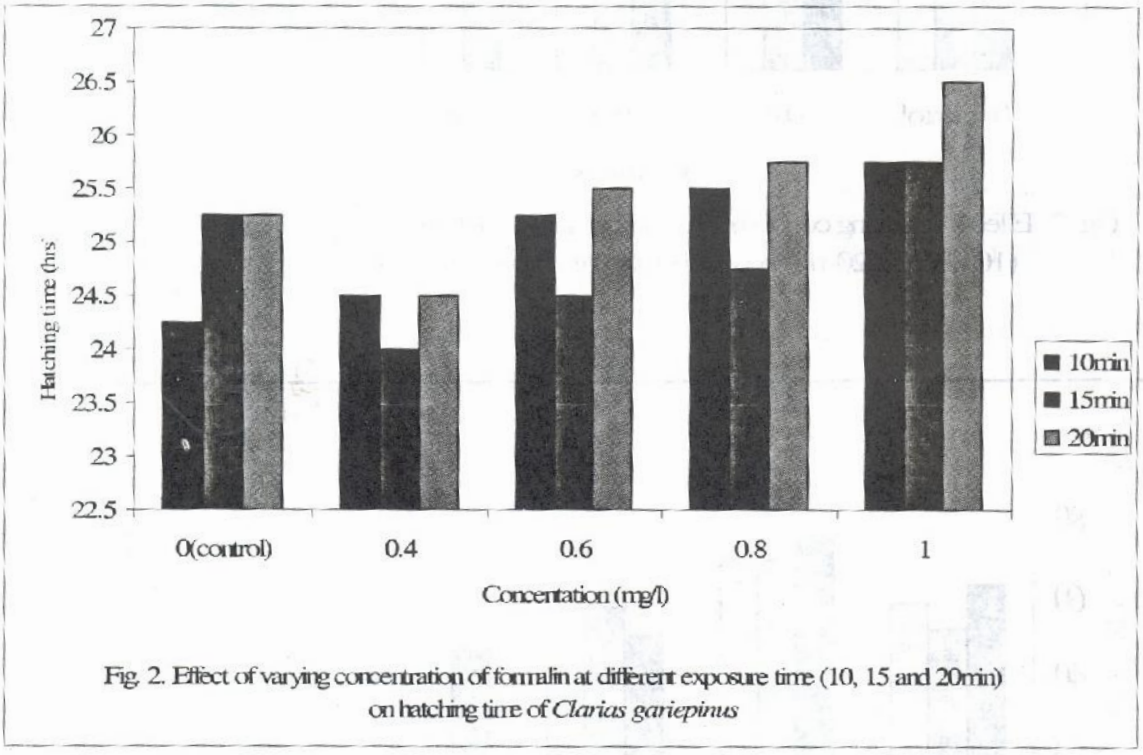

Fig. 2. Effect of varying concentration of formalin at different exposure time (10, 15 and 20min) on hatching time of *Clarias gariepinus*

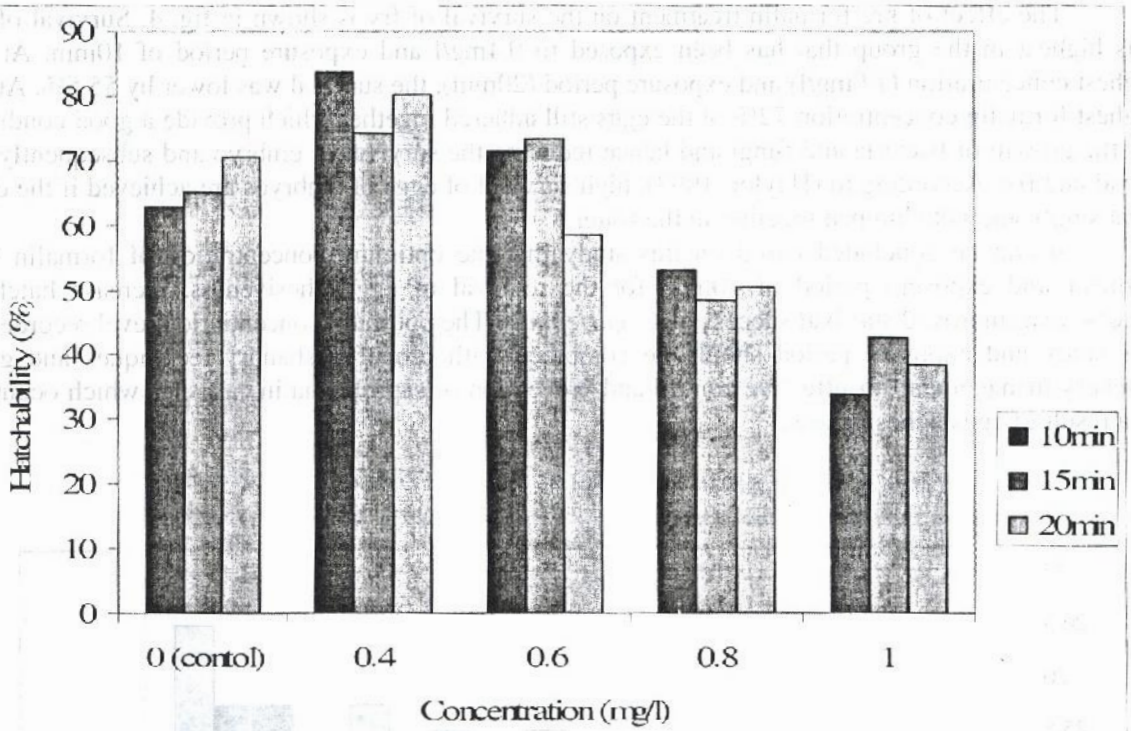

Fig. 3. Effect of varying concentration of formalin at different exposure time (10, 15 and 20min) on hatchability of *Clarias gariepinus*

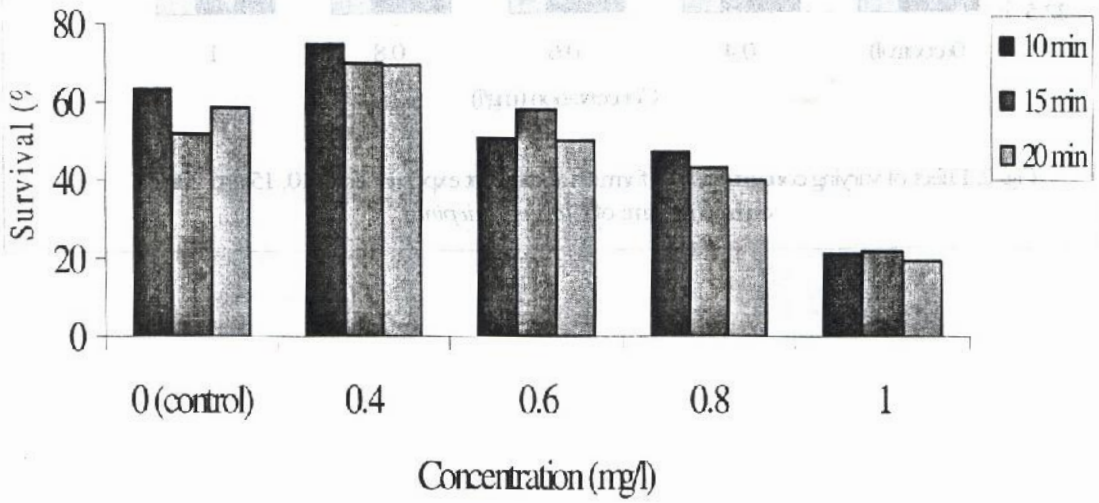

Fig. 4. Effect of varying of concentration of formalin at different exposure time (10. 15 and 20 min) on survival of Clarias gariepinus.

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